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(54) **FORMULATIONS D'AEROSOL SANS CHLOROFLUOROCARBURE**

(54) **NON-CHLOROFLUOROCARBON AEROSOL FORMULATIONS**

(57) Cette invention concerne des formulations d'aérosol ne contenant pratiquement pas de chlorofluorocarbones destinées à l'administration orale et/ou nasale. Lesdites formulations comprennent de l'heptafluoropropane 1,1,1,2,3,3,3, un médicament, facultativement un excipient et facultativement un tensioactif. Des procédés de traitement à l'aide de ces formulations sont également décrits.

(57) Aerosol formulations substantially free of chlorofluorocarbons for oral and/or nasal administration are described. The formulations comprise 1,1,1,2,3,3,3 heptafluoropropane, a medicament, optionally an excipient and optionally a surfactant. Methods of treatment utilizing the formulations are also described.

AL8

March 15, 1938. G. D. O'NEILL 2,111,002

ELECTRIC DISCHARGE TUBE OR THE LIKE

Filed Dec. 2, 1933

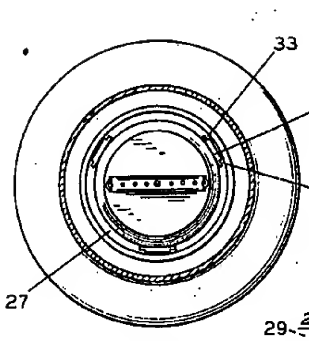


Fig. 2.

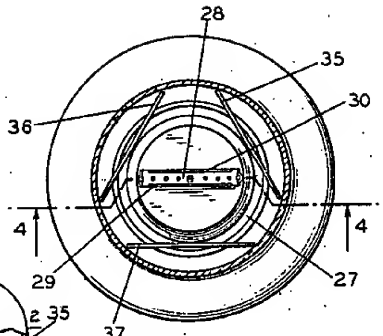


Fig. 3.

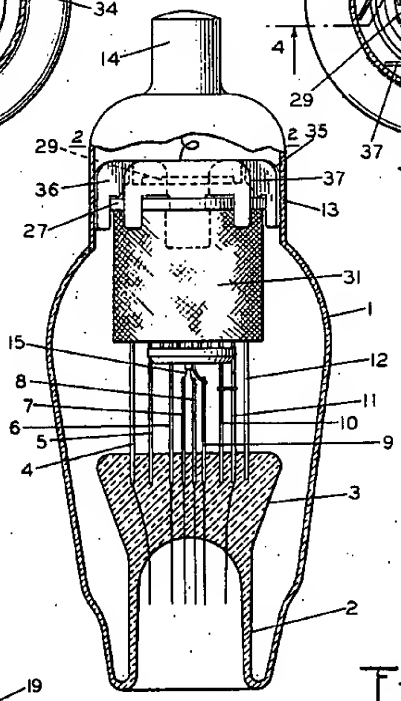


Fig. 1.

Fig. 4.

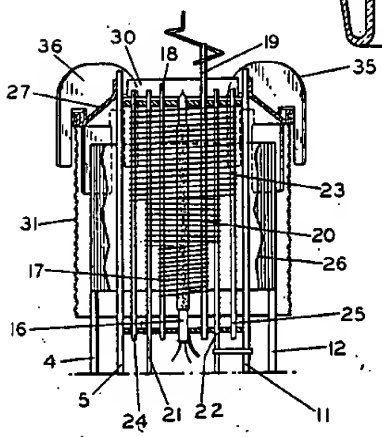
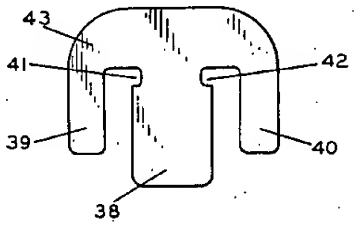


Fig. 5.



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Patented Mar. 15, 1938 2,111,002

UNITED STATES PATENT OFFICE

2,111,002

ELECTRIC DISCHARGE TUBE OR THE LIKE

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Application December 2, 1933, Serial No. 700,638

17 Claims. (Cl. 250—27.5)

This invention relates to electric discharge devices and with particularity to devices generally referred to as radio tubes, vacuum tubes, or the like.

An object of the invention is to provide novel means for supporting the electrode assembly of an electron discharge tube or the like.

Another object is to provide a novel device for resiliently supporting an electrode assembly interiorly against the wall of an enclosing envelope or the like.

In radio tubes generally, and more especially in the modern types of tubes, it is imperative that the various electrodes of the electrode assembly be maintained accurately in predetermined spatial relations, both with respect to one another and also with respect to the wall of the enclosing envelope which is usually provided with an external or internal shield. So-called "unitary" mounts or electrode assemblies have hitherto been provided wherein the electrodes are interlocked by means of insulating spacers or the like, and the electrodes, after being thus assembled, are supported from the press of the tube envelope. While such tubes are capable of maintaining their interelectrode spacings, nevertheless the entire weight of the electrode assembly must be borne by the press and the various wires sealed therein, the upper end of the assembly being usually free. Under certain conditions such as excessive external vibrations, the electrode assembly tends to sway or vibrate around the press support wires, so that the press adjacent these wires may crack, or one or more of the seal-ins may become defective. At the same time this vibration changes the electrostatic relation to the shield. If the vibration is not sufficient to destroy the seal, it may result in changes in the geometric configuration of the discharge space within the tube, by causing the assembly to vary its position with respect to the tube walls. This vibration usually results in so-called microphonic disturbances in the output of the tube when the latter is in use.

Accordingly, one of the principal objects of this invention is to provide a radio tube, lamp or similar device, wherein the filament or electrode assembly is supported both from the press as well as from the upper end of the envelope, whereby variations in the characteristics of the tube are substantially prevented even when the tube is subjected to heavy jars or vibrations.

Another object of the invention is to provide a so-called single-press tube with means for supporting the electrode assembly against tilting movement with respect to the press, without at the same time materially increasing the assembly cost or assembly time.

A feature of the invention relates to a radio tube of the so-called "dome" envelope type in conjunction with a novel form of resilient spacer for insulatingly supporting the electrode assembly within the dome.

A further feature relates to a novel form of "dome" spacer for radio tubes, the spacer being designed and proportioned so as to be deformable at its ends whereby it automatically conforms itself to different sizes and shapes of domes.

A further feature relates to a novel form of self-locking resilient insulating pad for dome-type tubes, which spacer also serves to prevent short-circuiting between certain electrodes of the tube.

A still further feature relates to improvements in so-called "unitary-assembly" tubes, whereby the cost of manufacture is reduced, while the reliability and accuracy of performance under varied operating conditions are materially increased.

Other features and advantages not specifically enumerated will be apparent after a consideration of the following descriptions and the appended claims.

While the invention will be disclosed herein as embodied in specific forms, it will be understood that the invention is not limited thereto, but is capable of embodiment in tubes, lamps and similar devices of different shapes and sizes.

Accordingly, in the drawing Fig. 1 is an elevational view of a tube with the envelope partly broken away to show the interior structure more clearly;

Fig. 2 is a sectional view along line 2—2 of Fig. 1, with the spacers or pads removed;

Fig. 3 is a sectional view of Fig. 1 along line 2—2 with the spacers or pads in position;

Fig. 4 is a detail sectional view of the electrode arrangement of Fig. 1; and

Fig. 5 is an enlarged view of one of the spacers or pads of Figs. 1, 3 and 4.

Referring more particularly to Fig. 1, the numeral 1 represents an enclosing envelope of glass or other suitable material such as ordinarily employed in radio tubes, lamps, etc. Envelope 1 is provided with a re-entrant stem which terminates in the usual press 2, wherein are sealed the various lead-in and support wires 4 to 12, inclusive. The envelope 1 has fastened to its lower end the conventional base carrying the usual contact prongs (not shown), said envelope terminating at its upper end in a substantially cylin-

drical dome-shaped portion 13 which carries the metallic contact cap 14. It will be understood that the envelope is hermetically sealed and exhausted in accordance with approved radio tube procedure, although as will be apparent from the following descriptions the invention is not limited to so-called high vacuum tubes, but may be equally well embodied in so-called gas or vapor tubes. Attached to wires 7 and 8 are the ends of the cathode heater filament 15, and while the drawing shows a cathode of the so-called indirectly heated type, it will be understood that the invention is not limited thereto, and that any well-known form of emitting cathode may be employed.

The cathode as shown is preferably of the type disclosed in Patent No. 1,950,456 wherein the heater filament 15 is insulatingly mounted within a metallic sleeve 16, the outer surface of which is coated with electron-emissive material in known manner. Surrounding the cathode is a control grid 17 in the form of a wire helically wound around a pair of metallic rods 18 and 19. A similar grid electrode 20 is fastened to support rods 21 and 22 and surrounds grid 17. Another grid 23, fastened to support rods 24 and 25, surrounds grid 20. Fastened to support rods 4 and 12 is a cylindrical plate electrode 26. It will be noted that the supports 5 and 11 extend upwardly beyond the other supports and have fastened thereto as by welding a metal cap 27, having a rectangular slit 28 therein, with the longitudinal edges 29 and 30 of the slit bent back at right angles to the face of the cap. Fastened to the cap 27 and depending therefrom is the meshlike electrode 31 which surrounds the plate electrode 26. As will be seen more clearly in Figs. 1 and 2, the cap member is provided with three equidistant slits 32. Each of these slits is so cut as to provide corners or shoulders 33 and 34 at opposite ends, each shoulder defining a narrower slit portion for purposes to be described below.

Supported by the cap member 27 are three spacers 35, 36, 37, according to the invention, one of the spacers being shown in enlarged detail in Fig. 5. Preferably the spacers are of a deformable insulating material such as strip mica or the like. Referring more particularly to Fig. 5, it will be seen that each spacer is of general E-shape, with the central leg 38 longer than the lateral legs 39, 40. It will also be noted that the leg 38 is provided with oppositely disposed notches 41, 42, and that the upper corners 43 are rounded. Each of the spacers is assembled in the cap member 27 in such a manner that the leg 38 passes through one of the slits 32, while the legs 39 and 40 engage the outer face of the electrode 31, as shown more clearly in Figs. 1 and 3. The pads are inserted far enough to cause the notches 41, 42 to register with the corners 33 and 34. Because of the flexibility of the mica, and because of the particular manner of assembling it as described, the notched portions 41, 42 snap into locking engagement with the corners 33, 34 so that the spacer locks itself against vertical movement. When the three spacers have been assembled as above described, it will be noted that the portions 38 extend downwardly into the space between the electrodes 26 and 31, thus preventing short-circuiting therebetween. Furthermore, when the dome portion 14 engages the lateral edges of the spacers as shown, these spacers are capable of conforming themselves to the internal diameter and shape of the dome, and because of the rounded portions 43 the electrode assembly may be positioned within the dome without danger of binding. Preferably, the spacers are of sufficient thinness so that their edge portions can be slightly rounded or deformed when assembled with the dome 14. It will be understood, of course, that the mica spacers have sufficient resiliency or flexibility that this rounding of the edges does not permanently deform the mica. It has been found that ordinary methods of fastening mica as by rivets, cement, etc, are entirely unsuitable for radio tubes or the like, where the parts are subjected to great variation of temperature.

The above described method of assembly, therefore, provides a positive locking engagement between the spacers and the electrode assembly without requiring any of the conventional fastening means, since all that is necessary is to insert the spacers as described, whereupon their inherent flexibility causes a positive self-locking engagement between the spacers and the electrode assembly. The pressure exerted against the dome by the edges of the spacers provides what may be termed "cushioned resistance" to motion or vibration of the electrode assembly, thus preventing rattle between the spacers and the glass.

While the drawing shows the mica spacers engaging the dome walls only at the vertical edges, it will be understood that, if desired, the said spacers may be designed so that their upper horizontal edges also engage the dome. It will be apparent from Fig. 5, for example, that because of the narrowing introduced by the notches 41 and 42, the upper edge portions of the mica may be capable of limited flexible deformation if it is desired to have these upper edges bear against the dome.

While the drawing shows a tube provided with three spacers mounted equiangularly around the axis of the tube, a greater or less number may be employed. Various changes and modifications may be made herein without departing from the spirit and scope of the invention. For example, while the invention is shown as embodied in a tube having cathode, anode, and three intermediate grids between cathode and anode, it may be utilized in any other well known type of tube having a greater or less number of electrodes.

What is claimed is:

1. In combination, an envelope containing an electrode assembly, and separable means for resiliently spacing said assembly from the wall of said envelope comprising a mica sheet having a yoke joining three spaced downwardly extending portions, and a plurality of horizontal notches in said sheet to interlock it with said assembly.

2. In combination, an envelope containing an electrode assembly, and separable means for resiliently spacing said assembly from the wall of said envelope comprising a plurality of substantially E-shaped insulators, with the central leg of each insulator having its opposite edges provided with notches to interlock the insulators with said assembly.

3. In combination, an envelope containing an electrode, and means for spacing said electrode from the wall of said envelope comprising an insulator member having a projection with notched edges interlocked with said electrode, and another projection disposed between said electrode and said wall.

4. In combination, an envelope containing an electrode, and means for spacing said electrode from the wall of said envelope, comprising a strip

of mica having deformable sides, and a central projection, said central projection having opposed notches to lock said strip to said electrode.

5. In combination, an envelope containing a substantially cylindrical electrode, said envelope having a substantially cylindrical dome-shaped portion to receive the end of said electrode, and a plurality of insulating resilient spacers disposed about said electrode, each of said spacers having a lateral portion adapted to be deformed to conform to the shape of said dome, each spacer also having edge notches for interlocking it with said electrode.

6. In combination, an envelope containing an electrode, and means for spacing said electrode from the wall of said envelope comprising a mica strip having a portion interposed between said electrode and said wall, and a tongue portion, said electrode being provided with a slit to receive said tongue portion to lock said strip in position.

7. In combination, an envelope containing an electrode, and means for spacing said electrode from the wall of said envelope, comprising a mica strip having lateral tongues disposed adjacent one face of said electrode, and a central tongue disposed adjacent the opposite face of said electrode, said central tongue being notched to lock said strip to said electrode.

8. In combination, an envelope containing a substantially cylindrical electrode, and a strip of insulating material having a pair of tongues disposed adjacent the outer face of said electrode, and another tongue disposed interiorly of said electrode, said electrode being provided with a slit to interlock with said other tongue.

9. In combination, an envelope containing an electrode, a slit in said electrode, a mica strip mounted on said electrode, said strip having a tongue passing through said slit, said tongue having oppositely disposed notches registering with the edges of said slit to lock said strip in position.

10. The combination according to claim 7, in which one edge of said slit is shorter than the opposite edge to define a pair of oppositely disposed shoulders which register with the said notches in said mica strip.

11. In combination, an envelope containing a pair of substantially coaxial electrodes, a substantially E-shaped strip of mica having its central tongue passing through a slit in one of said electrodes into the space between said electrodes, the lateral portions of said strip being disposed between the outer electrode and the wall of said envelope, the opposite edges of said central tongue being notched and interlocking with the ends of said slip.

12. A spacer member for radio tubes or the like, comprising a substantially E-shaped mica strip, with the opposite edges of the central leg of said strip provided with locking notches.

13. A spacer member according to claim 12, in which the strip is provided with notches to lock the strip in position on an electrode.

14. A spacer for an electrode assembly of a thermionic device having an enclosing envelope, said spacer comprising a resilient plate having three tongues extending from one edge thereof, one of said tongues having a notch formed on one of its edges adapted to engage cooperatively a portion of the electrode assembly.

15. A spacer for the electrode assembly of a thermionic device having an enclosing envelope comprising a substantially E-shaped and flat member formed of resilient material, one of the projections on said member having its edge notched to form a cooperative holding means with reference to the electrode assembly.

16. A shock absorber for the electrode assembly of a thermionic tube comprising a support member attached to said electrode assembly, and a plate of resilient material having a plurality of approximately parallel slots extending partially across said plate from one edge thereof forming tongues adapted to engage and be retained by said support member, one of said tongues being provided with a notch on its edge whereby a positive locking engagement is made with a portion of the support member when the assembly and plate are inserted in the tube.

17. An electron discharge device having an enclosing envelope with a tubular portion, an electrode assembly positioned within said envelope and including a member extending transversely across the upper end thereof, a slot adjacent the edge of said member, and a support member for steadying the assembly at its upper end, said support member comprising a sheet of resilient material having a yoke portion joining three downwardly extending spaced arms, one of said arms passing through said slot, and a pair of opposed notches in said support member to provide a positive locking engagement between said support member and said transverse member.

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